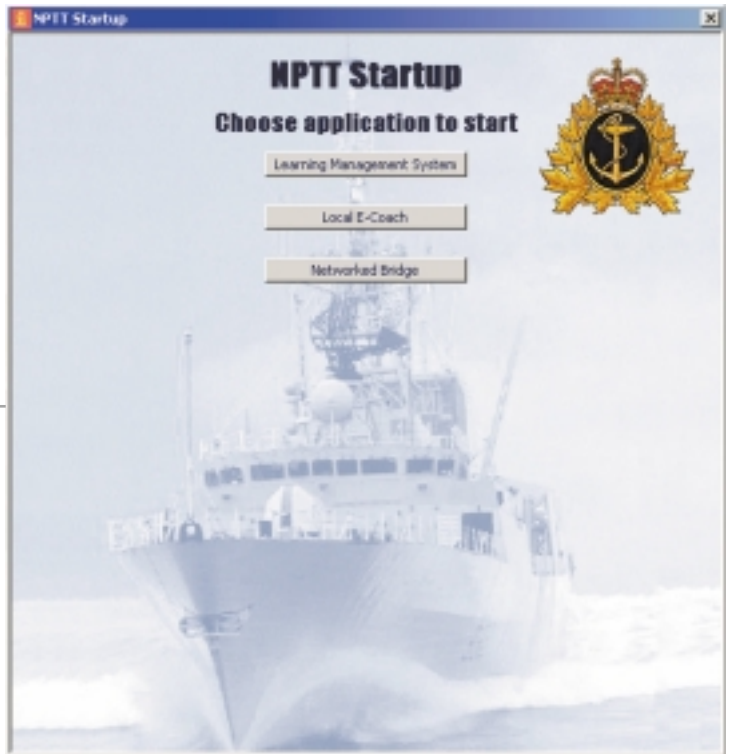


Shiphandling Simulators

In the Navy, shiphandling is a key element in the training and development of bridge officers and teams. It is a complex mix of knowledge, skills and judgment. There has been lively discussion about whether shiphandling is an art or a science, with a general consensus that it includes elements of both.



While requiring the ability to respond to the same types of situations and conditions as their civilian counterparts in large ships, Naval bridge officers and teams must additionally be able to conduct precision fleet formation manoeuvres at high speeds, conduct air operations, and integrate shiphandling with combat missions.

Up to the early 1990s, the Canadian Navy's training system to support the development of shiphandling abilities consisted of a dedicated training squadron of four steam destroyer escorts and five former minesweepers. As these came to the end of their economical and useful operational life, these ships had to be phased out of service. Even if they had remained functionally viable, they still represented a very expensive means of maintaining a training capability in terms of personnel diverted from operations, as well as maintenance and infrastructure

costs. Replacements for these classes of ships were the Canadian Patrol Frigates (CPF) (Halifax-Class) for operational use in traditional combat roles and the Kingston-Class Maritime Coastal Defence Vessels (MCDVs) which were now to be operated by the Naval Reserve. As these had an operational role and a Reserve role, respectively, there were no ships of similar type and size to dedicate to training.

As the Navy faced the loss of training platforms and the reduction of funds available for training, it was also presented with an opportunity in the form of the availability and potential of simulation technologies. The training philosophy of the Naval Fleet underwent a metamorphosis. In 1994, the Navy embarked on a programme to replace the practical training venues of the disappearing training vessels with alternative means.

The new capability was initially in the form of two large shore-based navigation and bridge simulators. Each of these consisted of two types of "bridges":

- Full Mission Bridges (FMS) with full 330-360° visual displays of the ship and surroundings, plus all sensor displays; and
- Blind pilotage bridges with all sensor displays but no visual "out of the window" view.

The first of these simulators (NAVSIM) was installed at the CF Naval Operations School (CFNOS) Halifax in 1995. It consists of one 330° FMS and three blind pilotage bridges. The principal roles of this simulator are to provide bridgemanship training at advanced levels and to support continuation training for Atlantic Fleet units.

The second, the Navigation and Bridge Trainer (NABS) was installed at the Naval Officer Training Centre (NOTC) at Esquimalt in 1997. It consists of one 360° FMS, three 330° FMS, and four blind pilotage bridges. This simulator is the principal delivery vehicle for all of the Navy's initial bridge officer training with the added role of performing for the Pacific fleet a similar role in continuation training that the Halifax one does for the Atlantic fleet. However, at this point, the newly established Naval Reserve Fleet School in Quebec City still had no bridge simulator capability.

The simulator environment has proven to be a very efficient and effective training medium. Instructors have complete control over scenarios and activities designed to meet specific training objectives. However, it has, not surprisingly, been found that there is a need to complement initial simulator training with sea time and environmental immersion on "real" ships. Sea time on operational warships is



Naval simulator

included in the training curriculum to address this requirement. For the Reserves, it is through experience on the MCDVs. The experience of the trainees in the simulators enables them to be well-prepared to make the optimal use of this sea time.

While the FMS and radar bridges have been very effective in training and exercising the full range of shiphandling training, there were some areas where supplemental systems were required. Examples are:

- **Independent Study and Development** – For initial bridge officer training, the four FMS bridges and instructors at the NOTC were used to full capacity in their formal course role leaving no time for students to work independently to reinforce their formal course time.
- **Instruction of Basic Skills** – Shiphandling involves a wide range of tasks, individually simple or complex. The FMS were used for training and exercising these individual tasks, but this constituted an under-utilization of this highly capable, expensive and instructor-intensive resource and detracts from its principal, team training, multi-task, full mission role.
- **Naval Reserve** – There was a need to provide skills maintenance training at 21 geographically dispersed Naval Reserve locations, few of which were in convenient proximity to the two FMS locations.

The Navy Part Task Trainer (NPPT) was an integrated expansion of the FMS technology to provide 64 desktop simulators for Canada-wide distribution. By expanding the FMS trainer functionality rather than creating new part task systems, full use was made of existing training databases, models and scenarios. As with the FMS trainers, the NPPT stations support high-fidelity simulation of ship hydrodynamics, visual scenery, sensors and controls. The

NPPT employs the same simulation engine as the FMS, running from conventional PCs. It employs a flexible network configuration and uses emulated panels to replicate the functionality of various items of bridge equipment and controls.

The NPPT includes a Learning Management System. Exercises can be controlled by an instructor or by a student for individual self-study, although student access to exercises is limited to those relevant to the student's level of training. The system includes electronic coaching and evaluation mechanisms. These allow experienced instructors to provide remote guidance and monitoring to large numbers of students.

The NPPT is reconfigurable to adapt to diverse training needs and skill levels. It allows individual training for skills development, advancement or continuation. Remote naval units have direct access to the centralized training infrastructure and pool of instructional expertise. In its planned shipboard application, it would allow this same capability for deployed personnel on ships at sea as well as provide a capability for mission rehearsal and post-event analysis.

In 2003, the NPPT was introduced into the naval training system as follows:

- **NOTC:** 26 stations in a networked laboratory, primarily for cadet training, and four mobile, stand-alone systems for classroom use;
- **Naval Reserve:** 27 stations in units and regional training centres and three in the Fleet School Quebec;
- **CFNOS:** three stations, primarily for FMS integration and development.

NPPT Screen

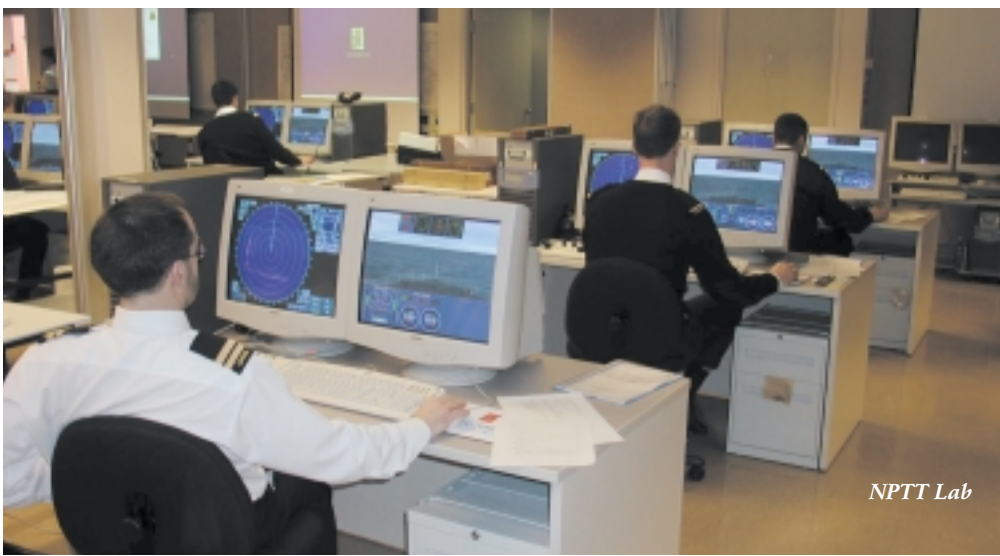


Other Allied Navies are following the Canadian trend of expanding the use of broad based simulation training. The US Navy has traditionally used on-the-job training (OJT) for basic watch-keeping and shiphandling. In 2003, they decided to support their training concept with a decentralized simulation system, across their ships and bases, and in May 2004 stood-up the first of these simulator sites in Yokosuka and Sasebo, Japan. The New Zealand and Australian Navies are also actively investigating the use of NPPT systems to supplement their existing simulation training capabilities.

Future plans include close monitoring of the experience of the existing systems to optimize training tasks among FMS, NPPT and OJT. Of particular interest is the planned expansion of NPPT to shipboard use. In this role it will not only enhance the continuity of training and skills maintenance, but will also impart an operational role to the system.

Through the combination of FMS trainers and the NPPT, the Canadian Navy has fielded a comprehensive and flexible, shiphandling simulation capability continuum ranging from the full FMS bridge operation scenario to individual discreet, basic tasks. It ranges from the specialized, full mission simulators at CFNOS and NOTC to networked desktop trainers dealing with the most basic of related tasks and allows for economical and efficient training at every level from individual student to bridge team.

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NPPT Lab